REMARKS

These Remarks are submitted under 35 U.S.C. § 132 and 37 C.F.R. § 1.111 in response to the Office Action mailed June 28, 2006.

Summary of the Examiner's Action and Applicant's Response

The Examiner indicated on page 2 of the Office Action that Claims 1-9 have been rejected under 35 U.S.C. § 102(b) based on the admitted prior art shown in FIG. 1 in the application. The Examiner indicated however, on page 6 of the Office Action that Claims 4 and 5 would be allowable if rewritten in independent form. Since no details were given as to any rejection under to 35 U.S.C. § 102(b) for Claims 4 and 5, Applicants assumes herein that Claims 4 and 5 would be allowable if rewritten in independent form. The Examiner has again rejected Claim 10 under 35 U.S.C. § 102(b) as being anticipated by Anderson, U.S. Patent No. 3,202,937.

The Applicant very much thanks the Examiner for his time considering our arguments and for his valuable insights during a telephonic interview conducted on September 19, 2006, hereinafter referred to as "the interview". The Examiner indicated during the interview that our arguments must be presented in a formal response so that he can better consider them.

Response to the Rejection of Claims 1-9 under 35 U.S.C. § 102(b)

The Examiner stated that prior art FIG. 1 in the application discloses a sawtooth generator for generating a sawtooth waveform as a function of a periodic pulse (30) coupled to said generator, comprising: a first capacitor (28) that is charged as a function of said periodic pulse and then discharged at a predetermined rate such that the voltage on said first capacitor defines said sawtooth waveform; and a reference circuit for limiting the peak voltage of said sawtooth waveform as a function of a predetermined reference voltage (Vcc), said reference circuit including a zener diode (26) for generating said predetermined reference voltage in response to a predetermined bias current when said zener diode is reverse biased, a first circuit (32, 36) coupled between said zener diode and said first capacitor and operative to limit the peak voltage on said capacitor as a function of said predetermined voltage, and a second circuit (32) for providing said predetermined bias current as a function of said periodic pulse such that said predetermined bias current is turned on during the time said first capacitor is being charged and off for a substantial amount of the time when said first capacitor is discharging. Applicant respectfully disagrees. Applicant notes initially that the

Examiner is incorrect when he identified Vcc as the predetermined reference voltage generated by the zener diode in FIG. 1 in the application, since the predetermined reference voltage is generated by the zener diode 26.

Applicant respectfully submits that the circuit in FIG. 1 does not teach providing a predetermined bias current for the zener diode as a function of a periodic pulse, such that the bias current is turned on during the time the capacitor is being charged and is turned off for a substantial amount of the time when the capacitor is discharging, as claimed in Claim 1. Applicant respectfully submits that, as is well known in the art and as described in the present specification, e.g., Paragraph [0002], the "bias current" is the current that is required for the zener diode to provide its voltage limiting functionality. Applicant respectfully submits that the bias current generated for the zener diode 26 in the circuit in prior art FIG. 1 is a constant current since it is connected in a path between Vcc and ground that does not contain any transistor switch, i.e., this current is not a function of a periodic pulse. Applicant respectfully submits that the constant bias current for the zener diode in FIG. 1 is provided by Vcc through resistors 44 and 36 connected to the cathode of zener diode 26, with the anode of zener diode 26 connected directly to ground. Applicant respectfully submits that there is no switch in this path.

As best understood from the interview, the Examiner appears to be concerned that diode 34 in FIG. 1, which is coupled between the cathode of the zener diode and the collector of transistor 32 via resistor 34, may provide bias current as a function of a periodic pulse, since the switching of transistor 32 is controlled by transistor 22, whose state is a function of the periodic pulse generated from the zero crossing detector 30. Applicant respectfully submits that diode 34 does not, and is unable to provide any bias current to zener diode 26.

Applicant respectfully submits that, in order for zener diode 26 to limit the voltage on capacitor 28 in FIG. 1, diode 34 must be conducting since it is the circuit element that couples the cathode of the zener diode to capacitor 28 when the voltage on capacitor 28 reaches the zener breakdown voltage plus a diode drop. That is, the current through diode 34 is only generated when the voltage on capacitor 28 rises to the point where zener diode 26 breaks down and becomes fully conductive. Applicant respectfully submits therefore that diode 34 is only conducting when it is limiting the voltage across the capacitor 28, and is not conducting at any other time, and is therefore not providing the zener diode with any bias current at any time.

In contrast, Applicant respectfully submits that, in the inventive circuit of FIG. 2, the anode

of zener diode 126 is coupled to the collector of the switch 122, and switch 122 goes on and off as a function of zero crossing detector 30. Consequently, transistor 122 provides the functionality of a bias current that is a function of a periodic pulse. Applicant respectfully submits therefore that FIG. 1 does not disclose providing the predetermined bias current such that it is turned on during the time the first capacitor is being charged and turned off for a substantial amount of time when the first capacitor is being discharged, as claimed in Claim 1.

The key reason for this functionality, according to the present invention, is that it saves energy by switching off the current flowing through the zener diode during most of the sawtooth interval. The current flowing through resistor 36, in contrast, is constantly provided in FIG. 1, such that this prior art circuit has the drawback of undesirable power dissipation, as noted in the present specification Paragraphs [0007-[0009] and shown graphically in FIG. 4

Applicant respectfully submits that FIG. 1 does not disclose a circuit for providing a predetermined bias current for a zener diode as a function of a periodic pulse, as claimed in Claim 1, such that the predetermined bias current is turned on during the time the first capacitor is being charged and off for a substantial amount of the time when the first capacitor is discharging. Applicant therefore respectfully submits that Claim 1 is not anticipated by prior art FIG. 1 in the application. Claims 2, 3, and 6-8 depend directly or indirectly from Claim 1 (in addition to Claims 4 and 5, which the Examiner indicates are allowable if rewritten into independent form), and thus are respectfully submitted as not being anticipated for the same reasons as above for Claim 1.

Further regarding Claim 3, Applicant respectfully submits that FIG. 1 does not teach having a collector of a first transistor coupled to the anode of a zener diode at a first node, as claimed in Claim 3. Applicant respectfully submits that the only way the anode of the zener diode in FIG. 1 could arguably be "coupled" to a transistor's collector would be via a path that included ground, e.g., through capacitor 24 via ground. Applicant respectfully submits that a coupling via ground cannot, by definition, provide signal coupling as understood by one of ordinary skill in the art. Applicant respectfully submits, therefore, that for this additional reason Claim 3 is not anticipated.

Claim 9 includes a fifth circuit for providing said predetermined bias current as a function of said periodic pulse such that said predetermined bias current is turned on during the time said first capacitor is being charged and off for a substantial amount of the time when said first capacitor is discharging. Applicant respectfully submits therefore that Claim 9 is not anticipated for the same reasons as above for Claim 1.

Response to the Rejection of Claims 10 under 35 U.S.C. § 102(b)

Regarding Claim 10, the Examiner stated that FIG. 1 in the application discloses a reference circuit for providing a reference voltage during a predetermined time interval comprising: a zener diode (26) for providing said reference voltage in response to a predetermined bias current when said zener diode is reverse biased, and a bias control circuit (32) for generating said predetermined bias current only during the predetermined time interval such that the zener diode provides the reference voltage only during the predetermined time interval. Applicant respectfully disagrees.

The reference circuit, as claimed in Claim 10, includes a bias control circuit for generating a predetermined bias current for a zener diode only during a predetermined time interval. Applicant respectfully submits that, in contrast, the circuit in prior art FIG. 1 generates a constant biasing current for zener diode 26, as described above regarding Claim 1. Applicant respectfully submits, therefore, that FIG. 1 does not disclose a circuit for generating a predetermined bias current only during a predetermined time interval, as claimed in Claim 10. Consequently, Applicant respectfully submits that Claim 1 is not anticipated by FIG. 1 in the application.

The Examiner has also rejected Claim 10 under 35 U.S.C. § 102(b) as being anticipated by Anderson. With respect to Applicant's arguments filed 4/4/2006, the Examiner stated in the Office Action that the predetermined time interval in Claim 10 can be any range of time because the Applicant does not specify it. The Examiner stated that, in Anderson, the predetermined time interval is the range of all time because the control circuit is constantly on. The Examiner indicated during the interview that the range of all time could be terminated at some point, e.g., by an operator turning off power to the circuit, and thus there would be a predetermined time interval in such a case. Applicant respectfully disagrees.

The bias control circuit in Claim 10 is for generating a predetermined bias current only during a predetermined time interval. Applicant respectfully submits that the time interval, as recited in Claim 10, is predetermined, that is, it is a time interval that is known in advance. For example, the time interval between zero crossing points of an AC voltage are known in advance and are, as a result, predetermined. Applicant respectfully submits that a range of all time, even one that can be terminated at some future time that is not determined in advance, is not a predetermined time interval, by definition. Further, Applicant respectfully submits that a predetermined time interval, as claimed in Claim 10, is a finite length of time. In contrast, a range of all times is infinity, i.e.,

such a range is not finite, it has no end point.

Applicant respectfully submits therefore that, for all of the above reasons, Anderson does not disclose a bias control circuit for generating a predetermined bias current for a zener diode only during a predetermined time interval, as claimed in Claim 10. Therefore, Applicant respectfully submits that Claim 10 is not anticipated by Anderson.

Conclusion

For the above reasons, Applicant respectfully submits that all pending claims, Claims 1-10, in the present application are allowable. Such allowance is respectfully solicited.

If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (415) 984-8200.

Respectfully submitted,

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